Ethnic inequalities in health in later life, 1993-2017: the persistence of health disadvantage over more than two decades

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Ethnic inequalities in health in later life, 1993-2017: The persistence of health disadvantage over more than two decades

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Abstract

Ethnic inequalities in health and wellbeing across the early and mid-life course have been well-documented in the United Kingdom. What is less known, is the prevalence and persistence of ethnic inequalities in health in later life. There is a large empirical gap focussing on older ethnic minority people in ethnicity and ageing research. In this paper, we take a novel approach to address data limitations by harmonising six nationally-representative social survey datasets that span more than two decades. We investigate ethnic inequalities in health in later life, and we examine the effects of socio-economic position and racial discrimination in explaining health inequalities. The central finding is the persistence of stark and significant ethnic inequalities in limiting long-term illness and self-rated health between 1993 and 2017. These inequalities tend to be greater in older ages, and are partially explained by contemporaneous measures of socio-economic position and racism and discrimination. Future data collection endeavours must better represent older ethnic minority populations and enable more detailed analyses of the accumulation of socio-economic disadvantage and exposure to racism over the life course, and its effects on poorer health outcomes in later life.

Keywords: ethnicity, health inequalities, later life, socio-economic disadvantage, racism and discrimination

Introduction

Ethnic inequalities in health and wellbeing across the early and mid-life course have been well-documented in the United Kingdom (UK) (Nazroo, 2001b). People from minoritised ethnic groups tend to have much poorer health outcomes over the life course than the white majority group. Ethnic inequalities are clearly observable in the early years and over childhood, for example, in birthweight (Kelly et al., 2009), asthma (Panico et al., 2007), obesity (Martinson et al., 2012), and early development (Dearden and Sibieta, 2010). Ethnic inequalities are also well-established into adulthood across a range of health outcomes, in general health measures such as self-rated health and limiting long-term illness (Nazroo, 2001b, Evandrou et al., 2016, Bécares, 2015, Darlington et al., 2015, Harding and Balarajan, 2000, Evandrou, 2000), specific conditions such as heart disease, hypertension, and diabetes (Nazroo, 2003, Nazroo, 1997, Bhopal et al., 2002), mental health and wellbeing (Wallace et al., 2016), and in life expectancy and healthy life expectancy (Wohland et al., 2015).

What is less known, is the prevalence and persistence of ethnic inequalities in health in older age (Evandrou et al., 2016, Watkinson et al., 2021). The few cross-sectional studies which have examined this have observed significant health inequalities for older ethnic minority people compared with the white majority group (Evandrou, 2000, Evandrou et al., 2016, Watkinson et al., 2021), but there is a scarcity of evidence on the persistence of inequalities over time. This is highly problematic, because the increasing population of older ethnic minority people will be a key demographic change over the next decades in Britain (see Victor et al., 2012, Lievesley, 2010).

Explanations for ethnic inequalities in health are complex, but are largely driven by inequalities in socio-economic position. People from some minoritised ethnic groups are disproportionately disadvantaged on a number of socio-economic axes: for example, living in more disadvantaged areas (Jivraj and Khan, 2015); having poorer housing quality, insecure tenures, or greater overcrowding (Finney and Harries, 2013, Shankley and Finney, 2020); having higher rates of unemployment or underemployment (Kapadia et al., 2015, Clark and Shankley, 2020) with cumulative, negative effects over the life course (Li and Heath, 2020); working in less advantaged, lower paid occupations (Brynin and Longhi, 2015); and often having more advantaged education levels which are not converted into corresponding occupational advantage (Zwysen and Longhi, 2018). Studies have shown that there are direct and adverse effects of socio-economic inequalities on people's physical and mental health and wellbeing (Bartley et al., 2004, Marmot, 2010, Scambler, 2012, Maheswaran et al., 2015, Marmot, 2020); ethnic inequalities in socio-economic position directly relate to ethnic inequalities in health.

Racism has been found to be a key direct and indirect driver of ethnic inequalities in health. Studies report a clear association between racial discrimination and detrimental physical health, mental health, and wellbeing outcomes (Wallace et al., 2016, Hackett et al., 2020, Karlsen and Nazroo, 2002, Bécares et al., 2009), independently of socio-economic position (Nazroo, 2003). Racism has a direct impact on health and wellbeing through several mechanisms, for example through stress pathways, physiological reactions such as hypertension or cardiovascular problems, or negative self-esteem and wellbeing (Karlsen and Nazroo, 2004, Karlsen and Nazroo, 2002, Wallace et al., 2016, Hudson et al., 2013, Williams and Mohammed, 2013). A key mechanism through which racism and racial discrimination indirectly and negatively impacts on health is by leading to socio-economic inequalities over the life course (Darlington et al., 2015, Williams, 1999, Bécares et al., 2009, Nazroo, 2003, Hudson et al., 2013, Gee et al., 2012, Gee et al., 2019).

Ethnic inequalities over the life course: The role of accumulating disadvantage

Ethnic inequalities in health outcomes, which are apparent in early life, increase as people age (Nazroo, 2004). One mechanism by which this occurs is through the accumulation of socio-economic disadvantage over the life course (Kendig and Nazroo, 2016, Dannefer, 2003). Cumulative disadvantage experienced by minoritised ethnic people in employment, earnings, housing, and neighbourhoods are underpinned and shaped by structural racism and racial discrimination. In turn, this leads to intergenerational transmission of (dis)advantage and inequality (Bécares et al., 2015).

Accumulation of disadvantage and experience or anticipation of racial discrimination leads to 'weathering' of the health of minoritised populations (Geronimus, 1992). The weathering hypothesis relates to the earlier onset of ill health, or deterioration, for many ethnic minority groups compared with the white majority group due to the accumulation of exposure to disadvantage along social and economic axes over the life course (Forde et al., 2019, Geronimus, 1992). In the UK, analyses of the Fourth National Survey of Ethnic Minorities supports the weathering hypothesis, demonstrating a stark widening of ethnic inequalities in health observed for people from their mid-30s onwards (Nazroo, 2001a). Analyses of Census data further demonstrate that people from many ethnic minority groups exhibit rates of poor health typical of the White British group who are significantly older (Stopforth et al., forthcoming).

Given the evidence of stark ethnic inequalities in health throughout childhood and into adulthood, and as socio-economic inequalities and racial discrimination persist and accumulate over the life course, we would expect that ethnic inequalities in health outcomes worsen in later life. Only a handful of studies in the UK have examined ethnic inequalities specifically in later life (see Evandrou et al., 2016, Watkinson et al., 2021, Evandrou, 2000). These studies have cited the importance of racism and discrimination in explaining ethnic health inequalities, but measures of racism have not been employed in the analyses. Importantly, there is limited evidence on the extent of ethnic health inequalities, and whether they persist over time. This is largely due to the neglect of older ethnic minority people in both ethnicity and ageing research (Torres, 2015, Phillipson, 2015, Bécares et al., 2020). In addition, existing datasets do not collect large enough samples to conduct robust analyses examining the circumstances of older people within specific ethnic minority groups over time and across cohorts (Becares et al., 2020).

In the present study, we take a novel approach to address data limitations by analysing cross-sectional data from a series of nationally-representative social surveys spanning more than two decades. We investigate the prevalence of ethnic inequalities in health in later life, and we examine the effects of socio-economic position and experienced racial discrimination in explaining health inequalities. We address the following research questions:

1. What is the prevalence of ethnic inequalities in health in later life?
2. To what extent do these inequalities persist over time?
3. What are the respective contributions of socio-economic position and racism in explaining ethnic inequalities in health?
4. Do ethnic inequalities in health increase, decrease, or stay the same in older ages?

We hypothesise that the importance of accumulation of disadvantage over the life course will lead to sizeable ethnic inequalities in health in older ages. We theorise that accounting for socio-economic position and racism and discrimination will attenuate ethnic inequalities as these are key drivers of ethnic inequalities in health. However, in the absence of suitable longitudinal data which adequately

captures life course exposure and accumulation of socio-economic inequality and experienced racial discrimination, we can only indirectly test this hypothesis using contemporaneous measures collected within cross-sectional surveys. We return to this issue in the conclusion.

Data and Measures

We analyse six datasets with data collections spanning more than 20 years (1993-2017): the Fourth National Survey of Ethnic Minorities 1993/94 (Berthoud et al., 1997), the Health Survey for England 1999 (National Centre for Social Research, 2010a), the Health Survey for England 2004 (National Centre for Social Research, 2010b), the Citizenship Survey 2007 (Department for Communities and Local Government, 2019), and Understanding Society wave 1 2009/11 and wave 7 2015/17 (University of Essex and Institute for Social and Economic Research, 2020).[i] All of the datasets have complex, multi-stage, stratified random sample survey designs and are nationally-representative of either England (Health Survey for England), England and Wales (Fourth National Survey of Ethnic Minorities and Citizenship Survey), or the UK (Understanding Society). Each survey deliberately over-samples ethnic minority respondents (more information on the design of each survey is provided in the supplementary material file). Each survey further contains adequate, comparable measures to analyse ethnic health inequalities and their hypothesised determinants. The analytical samples in this paper consist of respondents aged 40 and over living in England. We focus on people aged 40 and over to reflect the earlier onset of disease and ill health for many people from ethnic minority groups (see Nazroo, 2001a).

We examine two health outcomes: limiting long-term illness (LLTI) and self-rated health. For limiting long-term illness, respondents were asked whether they had any long-standing illness and if this limited their abilities to undertake typical, moderate, or day-to-day activities.[ii] We dichotomise any limiting long-term illness compared with none (reference category is no limiting long-term illness). In each survey, respondents were also asked to assess their general health on a five-point Likert scale. The exact wording of the questions and response options differ slightly between surveys, but we dichotomise excellent, very good, or good health compared with fair, poor/bad, or very poor/very bad health (reference category is excellent, very good, or good health). Further details on the questions and answer options for both measures in each dataset are provided in Table S1 in the supplementary material.

Ethnicity is self-reported in all surveys from a pre-defined list of ethnic groups. Our analyses are based on eight main groups comprising White/White British, Irish, Black Caribbean, Black African, Indian, Pakistani, Bangladeshi, and Chinese respondents (reference category is White/White British). The ethnicity variables differ slightly between surveys. In the Fourth National Survey of Ethnic Minorities and 1999 Health Survey for England, Black African people were not sampled. In the 1999 and 2004 Health Survey for England, White British is not distinct from White minority groups, although Irish respondents were identified. In our regression models, we adjust for age, age-squared (to capture non-linear effects), and sex. Age and age-squared are centred and included as continuous variables, and sex is a categorical variable comprising men and women (reference category is men).

We harmonise measures of household income, individual education level, and household NS-SEC as closely as possible in each dataset, to reflect socio-economic position. We measure income in quintiles, based on gross household equivalised income using the OECD modified scale (see Chapter 3 in Office for National Statistics, 2015) (reference category is the highest quintile). For Understanding

Society, income is provided as a continuous measure, but in all other surveys income is collected through categorical measures of income brackets. We use the midpoint of these income brackets to derive our measure. A measure of household income is asked in all surveys except the Citizenship Survey, where we create a pseudo household measure combining income information from both the respondent and partner. In each survey, we use the derived quintile measure (i.e. relative position within the survey context) rather than an absolute measure due to the difference in measurement in the original data collection exercises in each survey.

Education level is measured as the highest education qualification of the respondent and dichotomised between degree-level education and less than degree-level education (reference category is degree-level education). In the 1999 and 2004 Health Survey for England, and Citizenship Survey, degree-level education includes equivalent vocational qualifications such as NVQ Levels 4 and 5. This is not the case in Understanding Society, where NVQ Levels 3-5 are aggregated together and so cannot be included as a degree-level equivalent.

Social class is measured using the National Statistics Socio-Economic Classification (NS-SEC) as a 3-category measure of managerial and professional, intermediate, and routine and manual occupations at the household level (Rose and Pevalin, 2003) (reference category is managerial and professional occupations).[iii] For household social class, we take the social class of the household reference person where available. In the 1999 Health Survey for England there is a head of household indicator, which is similar to a household reference person but typically defaults to the oldest male in the household. In the Fourth National Survey of Ethnic Minorities, we create a pseudo household measure by taking the most advantaged social class position out of the respondent and their partner, as there is no indicator for household reference person or head of household. In the Fourth National Survey of Ethnic Minorities and 1999 Health Survey for England, NS-SEC is not deposited, but we derive this from deposited SOC codes and employment status.

Measures of racism and racial discrimination are not collected consistently in each dataset, and are only available in the Fourth National Survey of Ethnic Minorities, the Citizenship Survey, and Understanding Society. In Understanding Society measures of experienced racial discrimination are only available for a subset of respondents (the extra five minute sample, alternate waves only). In the Fourth National Survey of Ethnic Minorities, respondents are asked whether they have been the victim of physical attacks, property attacks, or verbal abuse in the past 12 months due to their race or skin colour. We aggregate and dichotomise these measures to capture whether the respondent has experienced any form of racist attack or abuse (reference category is none). Respondents are also asked whether they fear racial harassment and the extent: no, not very much, a fair amount, or a great deal (reference category is no). Finally, respondents who stated they do fear racial harassment are asked whether they have avoided a series of places or scenarios due to racial harassment in the past 2 years, which we dichotomise as yes or no (reference category is no). In the Citizenship Survey, respondents are asked whether they are worried about physical attacks due to skin colour, ethnic origin, or religion: not at all worried, not very worried, fairly worried, very worried, and don't know (reference category is not at all). In Understanding Society, respondents in the extra five minute sample are asked a series of measures about whether they have felt unsafe, avoided, been insulted, or been attacked in a list of places, and reasons for this. We combine ever been insulted or attacked due to ethnicity, nationality, or religion as a measure of experienced racist abuse, and we combine ever felt unsafe or avoided places due to ethnicity, nationality, or religion as a measure of anticipation of racial harassment. We dichotomise each measure as yes or no (reference category is no).

We harmonise measures as closely as possible across the six datasets. We further include categories of missingness for the socio-economic position and racism measures to retain sample size and statistical power (see Table S2 in the supplementary material). Each socio-economic and racism measure is therefore the same for all ethnic groups within each survey. Our aim is not to directly compare coefficients across surveys where the measures have been closely, but not exactly, harmonised across surveys (i.e. the socio-economic and racism measures). Instead, our analytical focus is on the relative rates of health outcomes within each survey, in order to better reflect the nature of inequalities over time (i.e. comparisons with the white majority group). This is a pragmatic and reasonable approach to working with multiple data sources and data collection exercises.

Statistical Analysis

We address our first and second research questions concurrently, by first presenting descriptive analyses of ethnic inequalities in health over time, and then estimating a series of cross-sectional logistic regression models of our health outcomes in each dataset. The initial models adjust for ethnicity, age, age-squared, and sex. To address our third research question, we additionally adjust for socio-economic position and, where measures are available, experienced racial discrimination. To assess changes in effect sizes after adjusting for socio-economic position and experienced racial discrimination, we compare the average marginal effects of LLTI and fair or poor self-rated health across all three models (for a discussion of comparing nested logistic regression models and methods to address this, see Connelly et al., 2016, Karlson et al., 2012, Mize et al., 2019). To address our fourth research question, we test for interaction effects of ethnicity, age, and age-squared to examine whether ethnic inequalities in health are greater in later life. We first examine this in each cross-sectional dataset separately. We then undertake an exploratory approach to overcome the restrictive sample sizes and associated statistical power, by pooling data. This enables us to explore indicative trends and underlying patterns of ethnic inequalities in later life which we might observe if we had access to adequate sample sizes of older ethnic minority people in existing datasets. The data are analysed using Stata 16 (StataCorp, 2019), adjust for complex survey designs, and are weighted using the appropriate deposited weights in each dataset.

Results

Table 1 presents summary statistics for respondents aged 40 and over by ethnicity and survey year.[iv] Generally, rates of limiting long-term illness (LLTI) and fair or poor self-rated health are lowest for White/White British, Irish, Black African, and Chinese respondents. Rates of LLTI and fair or poor self-rated health tend to be higher for Black Caribbean and Indian respondents, and are particularly high for Pakistani and Bangladeshi respondents. White/White British respondents have the oldest mean age compared with all other ethnic groups. Black African and Chinese respondents tend to have the youngest age profiles, around 7 to 10 years younger than the White/White British group.

White/White British and Irish respondents have similar and generally high rates in the most advantaged socio-economic positions. Chinese respondents are consistently highly over-represented in the most advantaged socio-economic positions. By comparison, Pakistani and Bangladeshi respondents are consistently highly under-represented in the highest income quintile and managerial and professional occupations across all survey years. Despite having much higher rates of degree-level

education, Black African and Indian respondents are consistently under-represented in the highest income quintile in all survey years. In the earlier survey years, Black Caribbean respondents tend to be more disadvantaged on all socio-economic axes compared with the total sample.

There are no clear patterns for the prevalence of reporting experiences of racial discrimination across ethnic minority groups. Experiences of physical or verbal abuse are less commonly reported than fearing racial harassment and altering behaviour to avoid harassment, e.g. avoiding places.

[Insert Table 1 about here]

Table 2 presents the results of the cross-sectional logistic regression models for LLTI by ethnicity, age, age-squared, and sex. There are clearly persisting ethnic health inequalities over time; this is particularly the case for Pakistani and Bangladeshi respondents. Pakistani respondents have statistically significant higher odds of LLTI than the White/White British group after accounting for age, age-squared, and sex in all years (ranging from Odds Ratio (O.R.). 1.66, 95 percent Confidence Intervals (C.I.) 1.19-2.32 in 2007 to O.R. 4.42, 95 percent C.I. 3.28-5.96 in 2015/17). Bangladeshi respondents also have significantly higher odds of LLTI than the White/White British group in all years (ranging from O.R. 2.17, 95 percent C.I. 1.14-4.14 in 2007 to O.R. 4.07, 95 percent C.I. 2.36-7.01 in 2015/17). Compared with the odds of LLTI for the White/White British group, Black Caribbean respondents have significantly higher odds in 2009/11 and 2015/17; and Indian respondents have significantly higher odds in 1999, 2009/11, and 2015/17. Chinese respondents have significantly lower odds of LLTI in 1999, 2004, and 2007. Black African respondents have significantly lower odds of LLTI in 2007, but significantly higher odds in 2009/11 and 2015/17. Irish respondents do not have significantly different odds of reporting LLTI compared to the White/White British group in any survey year.

[Insert Table 2 about here]

Table 3 presents the cross-sectional logistic regression models for fair or poor self-rated health by ethnicity, age, age-squared, and sex. There are similarly stark ethnic health inequalities which persist over time. Notably, there are significantly higher odds of fair or poor health for Black Caribbean, Indian, Pakistani, and Bangladeshi respondents across all models in most years (with exceptions for Indian and Bangladeshi respondents in 2015/17). The odds of reporting fair or poor self-rated health compared with the White/White British group are at least double for the Pakistani group (95 percent C.I. 1.51-2.85), at least 1.64 times higher (95 percent C.I. 0.94-2.87) for the Bangladeshi group, and at least 1.5 times higher (95 percent C.I. 1.09-2.14) for the Black Caribbean group in all years. Compared with the odds of fair or poor self-rated health for the White/White British group, Irish respondents have significantly higher odds in 1999 only; Chinese respondents have significantly higher odds in 1999 and 2004 only; and Black African respondents have significantly higher odds in 2004, but non-significant yet lower odds in all other years.

The magnitude of inequalities of LLTI and fair or poor self-rated health tend to fluctuate in adjacent survey years. Over time, the direction of effects suggest that inequalities in LLTI might be marginally increasing, whereas inequalities in fair or poor self-rated health might be marginally decreasing. Due to the differences in data and measurement collections and sample selection strategies, however, we

emphasise that these are tentative conclusions about the strength of effects over time.[v] Nonetheless, these results illustrate a clear persistence of health disadvantage over more than two decades. This health inequality is starkest for Pakistani and Bangladeshi respondents.

[Insert Table 3 about here]

In the next stage of analysis, we additionally adjust for socio-economic position and experiences of racial discrimination (where measures are available). Income, education, and social class are significantly associated with both LLTI and fair or poor self-rated health, whereby people in more advantaged socio-economic positions tend to have better health outcomes. Although there is a trend for a negative association between experienced racial discrimination and health, the magnitude and statistical significance of the associations differ across datasets. Adjusting for contemporaneous measures of socio-economic position and experienced racial discrimination partially explains ethnic health inequalities, although in most years we continue to observe significantly higher odds for Pakistani and Bangladeshi respondents for both LLTI and self-rated health, and significantly higher odds of fair or poor self-rated health for Black Caribbean and Indian respondents. Tables S3 and S4 in the supplementary material present the full regression output for all three models in each survey year.

We compare the marginal effects of the health outcomes to assess the effects of socio-economic position and experienced racial discrimination on ethnic inequalities for LLTI (Figure 1) and fair or poor self-rated health (Figure 2). Attenuations refer to the changes in relative probabilities (and narrowing of inequalities) between each minoritised group and the White/White British comparison group after adjusting for age, age-squared, and sex (Model 1), additionally adjusting for socio-economic position (Model 2), and additionally adjusting for experienced racial discrimination (Model 3).[vi] The changes in relative probabilities are expressed in percentage points.

Adjusting for socio-economic position has a significant and substantial attenuating effect on inequalities in all survey years for Pakistani respondents (7 to 10 percentage points for LLTI and 8 to 14 percentage points for fair or poor self-rated health) and Bangladeshi respondents (7 to 14 percentage points for LLTI and 7 to 19 percentage points for fair or poor self-rated health). There are more modest attenuating effects on inequalities in health for Black Caribbean respondents (1 to 4 percentage points for LLTI, and 1 to 7 percentage points for fair or poor self-rated health) and Indian respondents (0 to 5 percentage points for LLTI, and 1 to 6 percentage points for fair or poor self-rated health). The attenuations are significant in all years except 2009/11 for Indian respondents, and 2015/17 for both Black Caribbean and Indian respondents. The changes in inequalities in health are significant in all survey years for Black African respondents, however, the direction of effects are more nuanced. Where relative probabilities are higher than the White/White British group, inequalities in health are attenuated, but where relative probabilities are lower, inequalities in health increase between Models 1 and 2. Attenuations are significant for Chinese respondents in 1999 for LLTI and 2009/11 for both outcomes, and attenuations are negligible and non-significant for Irish respondents across all survey years.

Additionally adjusting for experienced racial discrimination has minimal substantive impact on the predicted probabilities for all ethnic groups (between 0 and 3 percentage points in all years). However, these slight attenuations are significant in models of LLTI for Indian respondents in 1993/94, and in models of self-rated health for Black Caribbean, Black African, Indian, Pakistani, and Bangladeshi respondents in 2007.

[Insert Figure 1 and Figure 2 about here]

To assess the changes and magnitude of ethnic health inequalities in later life, we estimate interaction effects for ethnicity, age, and age-squared in each of the datasets. The interaction effects are significant for both health outcomes, with $p<.001$ in all surveys except the Fourth National Survey of Ethnic Minorities.[vii] The interaction effects in each survey individually demonstrate patterns of increasing ethnic health inequalities in the oldest ages, with the greatest inequalities for Pakistani and Bangladeshi respondents compared with White/White British respondents. When interaction effects are calculated separately in each survey year, the trajectories of health inequalities in older ages are broadly similar for Black Caribbean, Indian, and Pakistani respondents, but variations are observable for Black African, Bangladeshi, and Chinese respondents (see Figures S1 and S2 in the supplementary material). These groups are also the most under-represented in the survey data, particularly in the oldest ages.

We re-estimated the interaction effects on a pooled dataset to work with increased sample sizes and associated statistical power. This is an exploratory approach, and the results are indicative of broader trends of ethnic health inequalities which we might observe given more adequate sample sizes of older ethnic minority people. The model includes the main effects of ethnicity, age, age-squared, sex, and survey year, and the interaction effects of ethnicity, age, and age-squared. The model is weighted using corresponding survey weights, with scaled adjustments to ensure that ethnicity is equally represented across surveys (i.e. that one survey does not have overriding influence). Where Understanding Society respondents were present in both waves 1 and 7, we only used the data from wave 1 for this model.

Figure 3 presents the indicative trends for LLTI and Figure 4 presents the indicative trends for fair or poor self-rated health. Inequalities tend to be greater for fair or poor self-rated health than for LLTI. Inequalities in health are greatest in the oldest ages for Pakistani, Bangladeshi, Black Caribbean, and Indian respondents, compared with the White/White British group. The differences in probabilities compared with the White/White British group tend to be consistently highest for Pakistani and Bangladeshi respondents, and more modest, but with steeper slopes, for Black Caribbean and Indian respondents. The trajectory of ethnic health inequalities is more nuanced for Black African and Chinese respondents. For fair or poor self-rated health, Black African and Chinese respondents have very similar or marginally higher probabilities of fair or poor self-rated health compared with the White/White British respondents, which are greatest for the oldest respondents. For LLTI, Chinese respondents have consistently lower probabilities of LLTI than the White/White British respondents, and Black African respondents have lower probabilities of LLTI in mid-life, but higher probabilities in the youngest and oldest ages. Irish respondents have very similar probabilities of LLTI and fair or poor self-rated health as White/White British respondents in all ages.

[Insert Figure 3 and Figure 4 about here]

Discussion and conclusions

In this paper we have taken a novel approach to examining inequalities over time by harmonising a wide range of social survey data spanning a period of more than 20 years. We find a clear persistence of ethnic inequalities in health in later life. There are stark and significant ethnic inequalities in limiting long-term illness and self-rated health for people aged 40 and over in the 1990s, 2000s, and the 2010s. Ethnic health inequalities tend to be largest in older ages, and are partially explained by contemporaneous measures of socio-economic position and experienced racial discrimination. The findings correspond with previous research examining ethnic inequalities in limiting long-term illness and self-rated health in adulthood (Nazroo, 2001b, Bécares, 2015, Darlington et al., 2015, Harding and Balarajan, 2000). Our findings build upon previous studies by specifically focussing on later life and by providing much needed evidence on the nature and persistence of ethnic inequalities in health.

Our results demonstrate that most minoritised ethnic groups have much poorer health profiles compared with the White/White British group. We find that older Black Caribbean, Indian, and particularly Pakistani and Bangladeshi respondents are worst affected by ill health. Ethnic health inequalities persist over time and are clearly observable in each survey year. These findings chime with previous work using Census data in 1991, 2001, and 2011 (Stopforth et al., forthcoming, Bécares, 2015). Ethnic inequalities in health also seem to be greater for older respondents, as evidenced by significant interaction effects between ethnicity, age, and age-squared. Approaches aimed at reducing ethnic inequalities need to adequately address the more nuanced magnitude and trajectory of ethnic inequalities in health in later life.

There are associations between less advantaged socio-economic positions and poorer health, and between experienced racial discrimination and poorer health. This complements previous research examining the importance of these structural determinants of health (Darlington et al., 2015, Williams, 1999, Bécares et al., 2009, Nazroo, 2003, Hudson et al., 2013). Ethnic inequalities in LLTI and fair or poor self-rated health are partially explained by contemporaneous measures of socio-economic disadvantage and experienced racial discrimination. Current socio-economic position modestly attenuates the effect sizes for Black Caribbean and Indian respondents, and more substantially attenuates the effect sizes for Pakistani and Bangladeshi respondents. We also observed that Pakistani and Bangladeshi groups were severely under-represented in the most advantaged socio-economic positions. It is therefore plausible that the stark and consistent socio-economic disadvantage experienced by Pakistani and Bangladeshi respondents in all survey years may therefore explain inequalities in health outcomes to a greater degree.

Experiences or anticipation of racism and discrimination tend to have more minor substantive attenuations on ethnic inequalities in both health outcomes in our statistical models. The measures of experienced racial discrimination available in the surveys analysed refer to a specific period in the recent past, which is likely to underestimate the fuller extent of racism on health outcomes compared with measures which can identify accumulation of racism and discrimination over time, domains, and generations (Wallace et al., 2016). Racism is not only experienced interpersonally, but also operates through socio-economic inequality. It is plausible that much of the effect of racism in our models is acting indirectly through socio-economic inequalities, representing a more complex mechanism of structural inequalities.

We also note that the variables available for socio-economic and racism are imperfect. The measures can only partially cover the full extent of socio-economic position and racism in the survey context.

The measures are cross-sectional, referring to one point in time, and cannot adequately capture life course accumulation of disadvantage on poorer health outcomes. We do, however, observe clear ethnic inequalities in later life. Prolonged exposure to disadvantage and discrimination will have longer-term effects than contemporaneous, cross-sectional measures can illustrate. Our results are associational rather than causal, and can only indirectly test the effects of cumulative disadvantage and experienced racial discrimination. We theorise that the core explanations of the stark ethnic health inequalities we observe in this paper are a product of accumulation of disadvantage and exposure to racism and discrimination over the life course. The evidence generated by our repeated cross-sectional models supports this theoretical approach. However, there is currently no suitable UK longitudinal survey data to directly test this hypothesis.

A key limitation in the present study is the restrictive sample sizes and associated statistical power in any one cross-sectional survey to examine ethnic inequalities for the oldest cohorts. Given this, we would conjecture that our cross-sectional results will underestimate the full extent of inequalities in later life. The lack of statistical power is particularly pertinent when calculating interaction effects. We took an exploratory approach to a data problem by calculating interaction effects on pooled data. The benefit of the pooled model was to work with much larger sample sizes than in any one dataset. However, we note the methodological limitations of pooling data, and stress that these analyses are exploratory, and the patterns are indicative of broader trends of inequalities in older age that we might observe if we were to have access to adequate sample sizes of older ethnic minority people in existing data.

In this paper, we have highlighted the data problem encountered when investigating ethnic inequalities in health for older people in England. There are large data and evidence gaps present to examine, monitor, and explain ethnic inequalities in health and socio-economic circumstances for older people in the UK, and the interrelated and cumulative effects of socio-economic position and racism over the life course (Bécares et al., 2020). This marginalisation in UK research is prevalent in both the gerontological field and ethnicity studies (Torres, 2015). Victor et al. (2021) outlined the need for gerontological research to more suitably reflect the increasing ethnic diversity of ageing populations. The lack of suitable data to study ethnic inequalities in the ageing process plays a large part in this marginalisation, as studies do not tend to have appropriate sample sizes of older respondents from minoritised ethnic groups to conduct robust analyses (Bécares et al., 2020). In the UK, we are privileged with access to large-scale, high-quality health and social survey data which enable suitable investigations of ageing for older White British people. These include birth cohort and longitudinal studies, such as the 1946 National Survey of Health and Development, 1958 National Child Development Study, the 1970 British Cohort Study, and the English Longitudinal Study of Ageing. However, these data tend not to allow either robust analyses of older ethnic minority people specifically, or to examine period and cohort differences.

By presenting analyses from a number of different data sources we can partially overcome some of the data limitations. We remain mindful of the limitations of using cross-sectional social surveys to study ethnic inequalities for older people, particularly in accurate measurement of life course accumulation of social and economic disadvantage, and understanding changes as people age. Nonetheless, we find clear ethnic inequalities in health which persist across the multiple data sources and health outcomes. Our results make an important contribution to the growing evidence base on ethnic health inequalities in later life over time in the UK.

The approach we present here needs to be reinforced with robust data collection in order to fully understand ethnic inequalities in health in later life (Bécares et al., 2020). Future data collection endeavours must focus not only on current socio-economic position and experiences of racism, but

encompass a longer-term approach to better understand the accumulation of disadvantage and its effects on poorer health outcomes for older ethnic minority people compared with the White British group. Improving longitudinal data resources for older ethnic minority people is a critical area of future investment. This much-needed data would enable researchers to directly test, and better understand, the effects of the accumulation of life course disadvantage on ethnic inequalities in health outcomes in later life.

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Tables and Figures

Table 1: Descriptive statistics by ethnicity and survey year, weighted data

	Fourth National Survey of Ethnic Minorities 1993/4	Health Survey for England 1999	Health Survey for England 2004	Citizenship Survey 2007	Understanding Society Wave 1, 2009/11	Understanding Society, Wave 7, 2015/17
White/White British						
Weighted n	1,493	4,206	49,872	7,110	21,354	16,813
Unweighted n	1,559	4,287	3,929	5,262	19,091	14,992
LLTI, % (SE)	47.7 (0.02)	34.0 (0.01)	33.8 (0.01)	26.0 (0.01)	26.8 (0.00)	32.2 (0.00)
Fair/poor health, % (SE)	33.7 (0.02)	31.8 (0.01)	31.2 (0.01)	29.8 (0.01)	27.3 (0.00)	25.2 (0.00)
Age, mean (SE)	58.7 (0.35)	59.4 (0.27)	59.2 (0.29)	59.2 (0.22)	59.5 (0.13)	60.8 (0.15)
Women, % (SE)	55.7 (0.01)	54.7 (0.01)	52.5 (0.01)	52.6 (0.01)	52.4 (0.00)	52.5 (0.00)
Highest income quintile, % (SE)	23.1 (0.01)	18.7 (0.01)	18.8 (0.01)	18.0 (0.01)	21.0 (0.00)	19.1 (0.00)
Degree education, % (SE)	5.5 (0.01)	11.3 (0.01)	14.6 (0.01)	15.9 (0.01)	17.2 (0.00)	22.6 (0.00)
Managerial /profess. social class, % (SE)	28.7 (0.02)	33.7 (0.01)	38.4 (0.01)	40.8 (0.01)	21.3 (0.00)	21.9 (0.00)
Experienced racist attack, % (SE)	-	-	-	-	1.3 (0.00)	-
Fear racial harassment, % (SE)	-	-	-	36.9 (0.01)	-	-
Avoided places due to racial harassment, % (SE)	-	-	-	-	2.4 (0.01)	-
Irish						
Weighted n	56	716	2,754	171	228	141
Unweighted n	61	743	760	120	212	171
LLTI, % (SE)	53.1 (0.05)	34.2 (0.02)	30.3 (0.02)	29.0 (0.05)	27.7 (0.03)	32.8 (0.05)
Fair/poor health, % (SE)	28.7 (0.05)	33.5 (0.02)	29.9 (0.02)	28.9 (0.05)	27.3 (0.03)	30.8 (0.05)
Age, mean (SE)	55.2 (2.43)	56.5 (0.57)	57.3 (0.62)	57.9 (1.39)	59.2 (1.01)	59.5 (1.23)
Women, % (SE)	54.2 (0.04)	54.1 (0.02)	56.8 (0.02)	53.5 (0.06)	51.1 (0.03)	46.5 (0.05)
Highest income quintile, % (SE)	26.2 (0.04)	19.1 (0.02)	21.8 (0.03)	21.2 (0.05)	25.4 (0.03)	24.2 (0.04)
Degree education, % (SE)	5.2 (0.03)	10.0 (0.01)	15.6 (0.02)	20.1 (0.05)	23.8 (0.03)	29.1 (0.05)
Managerial /profess. social class, % (SE)	38.0 (0.07)	32.3 (0.02)	37.3 (0.03)	39.9 (0.05)	24.5 (0.03)	23.5 (0.04)
Experienced racist attack, % (SE)	-	-	-	-	0 (0)	-
Fear racial harassment, % (SE)	-	-	-	48.7 (0.06)	-	-
Avoided places due to racial harassment, % (SE)	-	-	-	-	0 (0)	-
Black Caribbean						
Weighted n	310	590	630	70	248	131
Unweighted n	260	596	589	522	729	470
LLTI, % (SE)	48.5 (0.03)	37.1 (0.02)	36.2 (0.03)	27.3 (0.02)	31.6 (0.02)	37.0 (0.04)
Fair/poor health, % (SE)	52.6 (0.02)	51.4 (0.02)	44.0 (0.03)	38.4 (0.02)	34.3 (0.02)	31.7 (0.04)
Age, mean (SE)	55.3 (0.81)	57.8 (0.57)	56.0 (0.74)	54.9 (0.61)	55.1 (0.66)	56.8 (0.99)
Women, % (SE)	52.3 (0.04)	56.2 (0.02)	57.2 (0.02)	57.1 (0.03)	55.3 (0.02)	64.1 (0.03)
Highest income quintile, % (SE)	15.5 (0.03)	9.9 (0.01)	9.5 (0.02)	15.8 (0.02)	18.5 (0.02)	19.9 (0.03)
Degree education, % (SE)	3.5 (0.01)	4.2 (0.01)	12.3 (0.02)	15.3 (0.02)	17.0 (0.02)	24.3 (0.03)
Managerial /profess. social class, % (SE)	15.9 (0.05)	16.7 (0.02)	28.8 (0.03)	35.9 (0.03)	24.9 (0.02)	25.2 (0.03)
Experienced racist attack, % (SE)	10.5 (0.02)	-	-	-	7.3 (0.01)	-
Fear racial harassment, % (SE)	13.4 (0.02)	-	-	61.1 (0.03)	-	-
Avoided places due to racial harassment, % (SE)	5.8 (0.02)	-	-	-	7.4 (0.02)	-
Black African						
Weighted n	-	-	301	57	205	155
Unweighted n	-	-	305	330	535	423
LLTI, % (SE)	-	-	23.4 (0.03)	13.1 (0.02)	20.6 (0.02)	36.4 (0.04)
Fair/poor health, % (SE)	-	-	31.3 (0.03)	19.1 (0.02)	20.7 (0.02)	20.2 (0.03)
Age, mean (SE)	-	-	49.8 (0.70)	48.8 (0.71)	48.9 (0.46)	51.0 (1.32)
Women, % (SE)	-	-	53.5 (0.03)	48.6 (0.03)	52.6 (0.02)	55.3 (0.03)
Highest income quintile, % (SE)	-	-	12.3 (0.03)	12.2 (0.02)	15.9 (0.02)	12.4 (0.03)
Degree education, % (SE)	-	-	31.2 (0.04)	35.2 (0.03)	38.3 (0.03)	37.8 (0.04)
Managerial /profess. social class, % (SE)	-	-	38.5 (0.04)	38.2 (0.04)	28.1 (0.03)	23.8 (0.04)
Experienced racist attack, % (SE)	-	-	-	-	9.2 (0.02)	-
Fear racial harassment, % (SE)	-	-	-	63.9 (0.04)	-	-
Avoided places due to racial harassment, % (SE)	-	-	-	-	8.9 (0.02)	-
Indian						
Weighted n	407	618	1,020	124	441	289
Unweighted n	409	629	616	675	795	837

LLTI, % (SE)	39.7 (0.03)	36.1 (0.03)	32.2 (0.02)	24.3 (0.02)	35.2 (0.02)	39.4 (0.03)
Fair/poor health, % (SE)	44.6 (0.03)	47.2 (0.03)	43.4 (0.03)	36.3 (0.02)	30.2 (0.02)	22.9 (0.02)
Age, mean (SE)	52.8 (0.54)	53.4 (0.61)	53.8 (0.61)	53.8 (0.60)	54.1 (0.54)	53.5 (1.08)
Women, % (SE)	48.0 (0.06)	47.7 (0.02)	53.7 (0.01)	42.6 (0.02)	42.2 (0.01)	46.0 (0.02)
Highest income quintile, % (SE)	11.1 (0.03)	9.3 (0.02)	10.2 (0.02)	14.3 (0.02)	19.8 (0.02)	28.1 (0.04)
Degree education, % (SE)	19.4 (0.04)	20.7 (0.02)	23.4 (0.02)	23.2 (0.02)	26.8 (0.02)	31.8 (0.03)
Managerial /profess. social class, % (SE)	13.9 (0.03)	27.4 (0.03)	31.4 (0.03)	35.7 (0.03)	26.4 (0.02)	32.7 (0.04)
Experienced racist attack, % (SE)	7.3 (0.01)	-	-	-	10.0 (0.01)	-
Fear racial harassment, % (SE)	24.4 (0.03)	-	-	77.9 (0.02)	-	-
Avoided places due to racial harassment, % (SE)	16.8 (0.03)	-	-	-	16.1 (0.02)	-
Pakistani						
Weighted n	150	395	332	50	190	118
Unweighted n	228	406	336	259	472	495
LLTI, % (SE)	55.6 (0.05)	43.0 (0.03)	45.6 (0.04)	29.7 (0.03)	43.3 (0.03)	56.2 (0.04)
Fair/poor health, % (SE)	60.2 (0.02)	59.4 (0.03)	55.3 (0.03)	45.6 (0.04)	44.3 (0.03)	35.4 (0.04)
Age, mean (SE)	51.9 (0.82)	51.3 (0.51)	53.6 (0.78)	51.8 (0.71)	52.9 (1.44)	52.1 (0.97)
Women, % (SE)	45.1 (0.04)	45.4 (0.02)	51.4 (0.02)	37.4 (0.03)	42.8 (0.02)	46.2 (0.02)
Highest income quintile, % (SE)	3.3 (0.02)	4.5 (0.02)	7.4 (0.02)	6.2 (0.02)	7.9 (0.02)	2.1 (0.01)
Degree education, % (SE)	9.9 (0.04)	11.4 (0.02)	14.4 (0.02)	20.8 (0.03)	22.9 (0.02)	26.3 (0.04)
Managerial /profess. social class, % (SE)	3.7 (0.01)	12.9 (0.02)	19.6 (0.03)	22.5 (0.03)	14.3 (0.02)	15.9 (0.03)
Experienced racist attack, % (SE)	9.6 (0.02)	-	-	-	8.7 (0.02)	-
Fear racial harassment, % (SE)	21.9 (0.05)	-	-	77.8 (0.03)	-	-
Avoided places due to racial harassment, % (SE)	17.8 (0.03)	-	-	-	16.4 (0.03)	-
Bangladeshi						
Weighted n	49	331	121	17	66	46
Unweighted n	94	353	279	74	295	169
LLTI, % (SE)	58.6 (0.05)	48.8 (0.04)	47.3 (0.03)	34.9 (0.07)	41.5 (0.04)	51.9 (0.06)
Fair/poor health, % (SE)	66.9 (0.07)	70.8 (0.03)	65.4 (0.04)	40.9 (0.07)	44.2 (0.04)	29.3 (0.06)
Age, mean (SE)	50.7 (0.63)	54.0 (0.68)	52.6 (0.82)	51.3 (1.25)	52.8 (0.70)	50.8 (1.55)
Women, % (SE)	54.6 (0.07)	44.4 (0.02)	44.6 (0.02)	30.5 (0.07)	30.0 (0.03)	34.0 (0.05)
Highest income quintile, % (SE)	3.7 (0.02)	0.8 (0.01)	0 (0)	1.3 (0.01)	13.1 (0.04)	9.0 (0.03)
Degree education, % (SE)	8.4 (0.05)	4.3 (0.02)	5.9 (0.02)	9.7 (0.05)	17.0 (0.04)	23.6 (0.05)
Managerial /profess. social class, % (SE)	6.1 (0.04)	3.4 (0.01)	12.1 (0.02)	16.8 (0.06)	15.0 (0.04)	15.7 (0.05)
Experienced racist attack, % (SE)	6.9 (0.02)	-	-	-	5.2 (0.02)	-
Fear racial harassment, % (SE)	21.3 (0.06)	-	-	79.0 (0.05)	-	-
Avoided places due to racial harassment, % (SE)	18.3 (0.06)	-	-	-	6.4 (0.02)	-
Chinese						
Weighted n	65	360	147	13	53	45
Unweighted n	42	366	336	61	86	86
LLTI, % (SE)	39.5 (0.10)	18.1 (0.02)	14.8 (0.02)	4.6 (0.03)	18.9 (0.06)	16.0 (0.06)
Fair/poor health, % (SE)	38.0 (0.08)	34.5 (0.04)	33.0 (0.03)	28.0 (0.08)	14.2 (0.05)	18.1 (0.06)
Age, mean (SE)	52.0 (2.66)	52.0 (0.67)	52.4 (0.59)	51.1 (1.15)	51.4 (0.69)	50.6 (2.39)
Women, % (SE)	34.5 (0.09)	53.6 (0.02)	54.4 (0.02)	60.7 (0.09)	43.0 (0.05)	42.1 (0.07)
Highest income quintile, % (SE)	31.0 (0.14)	18.5 (0.04)	20.7 (0.03)	35.1 (0.08)	33.3 (0.07)	33.4 (0.08)
Degree education, % (SE)	17.4 (0.04)	15.6 (0.03)	32.5 (0.03)	43.3 (0.08)	47.5 (0.07)	55.7 (0.08)
Managerial /profess. social class, % (SE)	26.6 (0.11)	31.7 (0.04)	43.4 (0.04)	52.9 (0.08)	44.0 (0.07)	43.4 (0.09)
Experienced racist attack, % (SE)	5.1 (0.03)	-	-	-	17.6 (0.05)	-
Fear racial harassment, % (SE)	12.7 (0.05)	-	-	70.6 (0.08)	-	-
Avoided places due to racial harassment, % (SE)	5.2 (0.02)	-	-	-	18.3 (0.05)	-
Total sample *n*						
Weighted n	2,528	7,214	55,178	7,611	22,783	17,738
Unweighted n	2,653	7,380	7,150	7,303	22,215	17,643
LLTI, % (SE)	47.1 (0.02)	34.8 (0.01)	33.6 (0.01)	26.0 (0.01)	27.2 (0.00)	32.6 (0.00)
Fair/poor health, % (SE)	40.0 (0.03)	38.3 (0.01)	31.7 (0.01)	30.0 (0.07)	27.6 (0.00)	25.3 (0.00)
Age, mean (SE)	56.5 (0.57)	57.4 (0.22)	58.8 (0.26)	58.9 (0.20)	59.1 (0.12)	60.4 (0.15)
Women, % (SE)	52.8 (0.01)	53.1 (0.00)	52.7 (0.01)	52.3 (0.01)	52.0 (0.00)	52.4 (0.00)
Highest income quintile, % (SE)	18.9 (0.02)	15.6 (0.01)	18.6 (0.01)	17.8 (0.01)	20.8 (0.00)	19.1 (0.00)
Degree education, % (SE)	8.1 (0.02)	11.3 (0.01)	14.9 (0.01)	16.4 (0.01)	17.7 (0.00)	23.0 (0.00)
Managerial /profess. social class, % (SE)	23.0 (0.03)	29.0 (0.01)	38.0 (0.01)	40.5 (0.01)	21.5 (0.00)	22.1 (0.01)
Experienced racist attack, % (SE)	3.3 (0.01)	-	-	-	6.3 (0.01)	-
Fear racial harassment, % (SE)	7.6 (0.02)	-	-	38.7 (0.01)	-	-
Avoided places due to racial harassment, % (SE)	5.0 (0.02)	-	-	-	8.8 (0.01)	-

Table 2: Logistic regression models of limiting long-term illness across survey years (odds ratios and 95 percent confidence intervals)

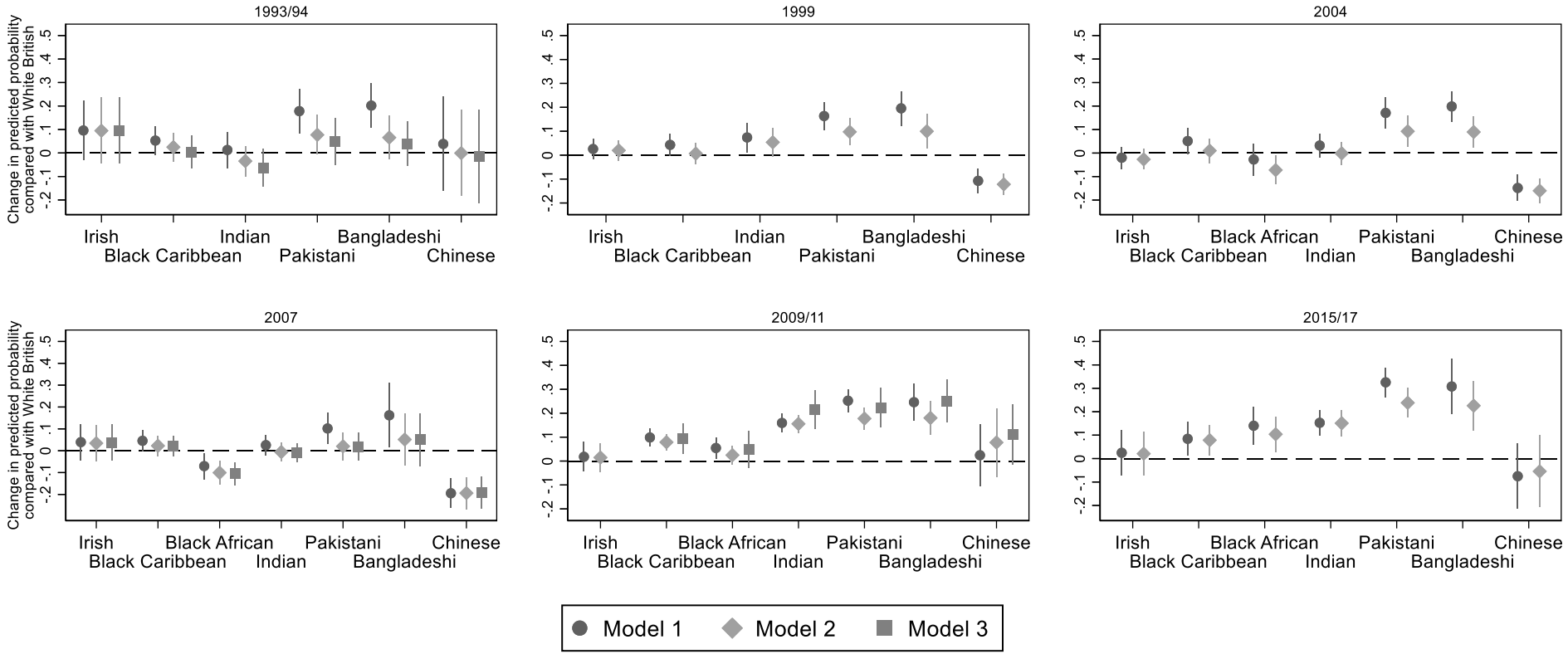
	Fourth National Survey of Ethnic Minorities 1993/4	Health Survey for England 1999	Health Survey for England 2004	Citizenship Survey 2007	Understanding Society Wave 1, 2009/11	Understanding Society, Wave 7, 2015/17
	O.R. (95% C.I.)	O.R. (95% C.I.)	O.R. (95% C.I.)	O.R. (95% C.I.)	O.R. (95% C.I.)	O.R. (95% C.I.)
Ethnicity						
White/White	1.00	1.00	1.00	1.00	1.00	1.00
British	[1.00,1.00]	[1.00,1.00]	[1.00,1.00]	[1.00,1.00]	[1.00,1.00]	[1.00,1.00]
Irish	1.56	1.13	0.91	1.23	1.11	1.13
	[0.87,2.78]	[0.93,1.38]	[0.72,1.14]	[0.81,1.87]	[0.78,1.58]	[0.71,1.82]
Black	1.28	1.22	1.27	1.27	1.70***	1.50*
Caribbean	[0.97,1.69]	[0.99,1.51]	[0.98,1.63]	[1.00,1.61]	[1.41,2.06]	[1.08,2.09]
Black			0.88	0.65*	1.36*	1.93***
African			[0.63,1.22]	[0.44,0.97]	[1.07,1.72]	[1.35,2.75]
Indian	1.06	1.40*	1.16	1.15	2.29***	2.04***
	[0.74,1.52]	[1.06,1.85]	[0.92,1.47]	[0.90,1.46]	[1.90,2.76]	[1.60,2.60]
Pakistani	2.30**	2.06***	2.13***	1.66**	3.52***	4.42***
	[1.46,3.61]	[1.60,2.65]	[1.59,2.84]	[1.19,2.32]	[2.82,4.40]	[3.28,5.96]
Bangladeshi	2.58***	2.36***	2.39***	2.17*	3.42***	4.07***
	[1.63,4.08]	[1.74,3.21]	[1.81,3.17]	[1.14,4.14]	[2.40,4.87]	[2.36,7.01]
Chinese	1.20	0.56***	0.44***	0.19**	1.15	0.66
	[0.47,3.03]	[0.41,0.76]	[0.30,0.63]	[0.06,0.57]	[0.55,2.39]	[0.29,1.52]
Age	1.06***	1.04***	1.04***	1.04***	1.06***	1.05***
(centred)	[1.06,1.07]	[1.03,1.04]	[1.03,1.05]	[1.03,1.05]	[1.05,1.06]	[1.04,1.05]
Age^2	1.00	1.00	1.00	1.00	1.00***	1.00***
(centred)	[1.00,1.00]	[1.00,1.00]	[1.00,1.00]	[1.00,1.00]	[1.00,1.00]	[1.00,1.00]
Sex						
Male	1.00	1.00	1.00	1.00	1.00	1.00
	[1.00,1.00]	[1.00,1.00]	[1.00,1.00]	[1.00,1.00]	[1.00,1.00]	[1.00,1.00]
Female	2.01***	1.11*	1.10	1.05	1.39***	1.42***
	[1.70,2.38]	[1.01,1.23]	[0.97,1.26]	[0.92,1.21]	[1.30,1.48]	[1.31,1.54]
Observations	2653	7380	7150	7303	22215	17643
Adjusted R^2	0.10	0.04	0.05	0.05	0.10	0.08
BIC	3377.89 (10)	9178.03 (10)	8779.35 (11)	8371.79 (11)	23796.87 (11)	20559.52 (11)

*p<.05 * p<.01 ** p<.001 ***.*

Table 3: Logistic regression models of fair or poor self-rated health across survey years (odds ratios and 95 percent confidence intervals)

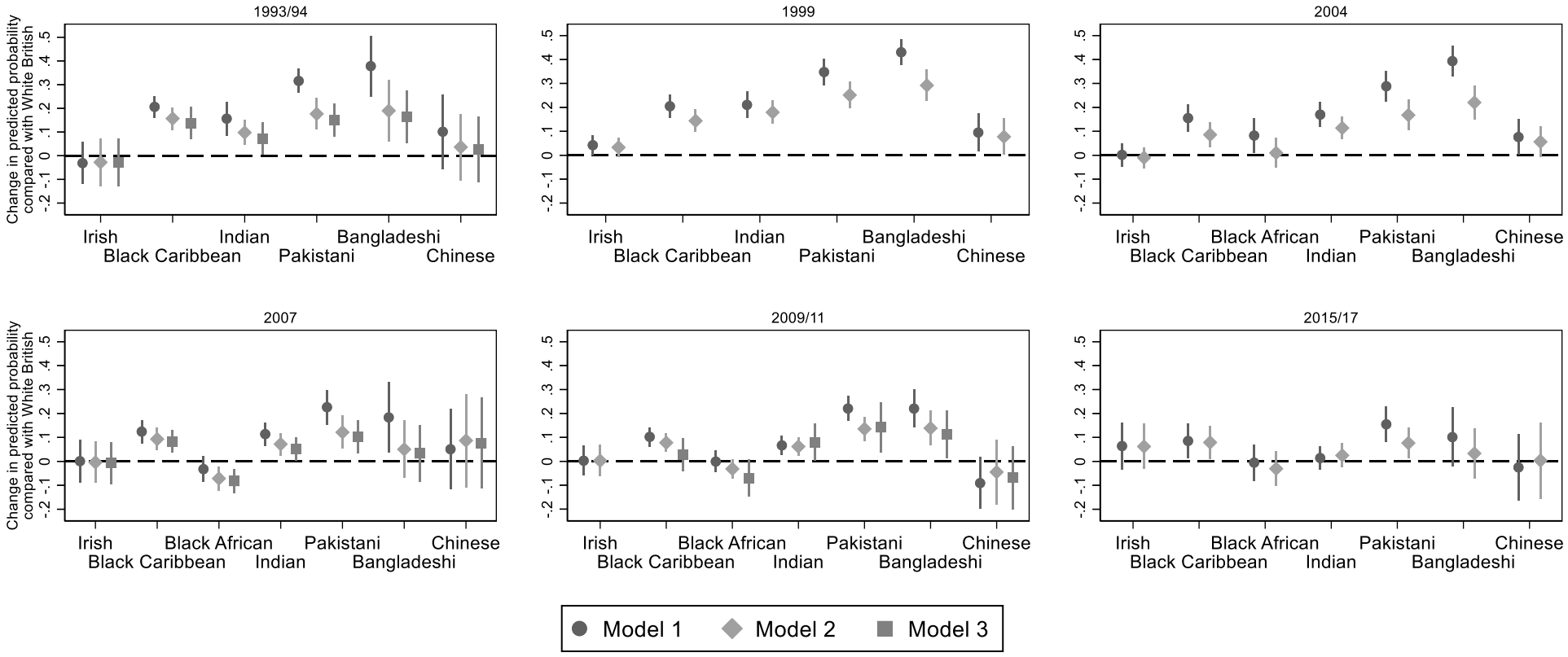
	Fourth National Survey of Ethnic Minorities 1993/4	Health Survey for England 1999	Health Survey for England 2004	Citizenship Survey 2007	Understanding Society Wave 1, 2009/11	Understanding Society, Wave 7, 2015/17
	O.R. (95% C.I.)	O.R. (95% C.I.)	O.R. (95% C.I.)	O.R. (95% C.I.)	O.R. (95% C.I.)	O.R. (95% C.I.)
Ethnicity						
White/	1.00	1.00	1.00	1.00	1.00	1.00
White British	[1.00,1.00]	[1.00,1.00]	[1.00,1.00]	[1.00,1.00]	[1.00,1.00]	[1.00,1.00]
Irish	0.86	1.23*	1.01	1.00	1.01	1.38
	[0.55,1.34]	[1.01,1.49]	[0.80,1.27]	[0.64,1.57]	[0.73,1.40]	[0.87,2.20]
Black	2.44***	2.51***	2.01***	1.78***	1.63***	1.53*
Caribbean	[1.99,2.98]	[2.03,3.11]	[1.57,2.58]	[1.43,2.22]	[1.36,1.96]	[1.09,2.14]
Black			1.47*	0.84	0.99	0.97
African			[1.06,2.03]	[0.63,1.13]	[0.79,1.26]	[0.64,1.47]
Indian	1.98***	2.57***	2.14***	1.70***	1.39***	1.08
	[1.47,2.67]	[2.02,3.27]	[1.71,2.68]	[1.37,2.12]	[1.15,1.68]	[0.83,1.39]
Pakistani	3.90***	4.70***	3.56***	2.76***	2.71***	2.08***
	[3.08,4.92]	[3.60,6.15]	[2.67,4.73]	[2.02,3.77]	[2.17,3.37]	[1.51,2.85]
Bangladeshi	5.22***	7.09***	5.80***	2.30**	2.71***	1.64
	[2.81,9.70]	[5.33,9.43]	[4.17,8.06]	[1.22,4.33]	[1.94,3.78]	[0.94,2.87]
Chinese	1.57	1.56*	1.43*	1.28	0.58	0.87
	[0.80,3.08]	[1.09,2.23]	[1.02,1.99]	[0.58,2.81]	[0.27,1.23]	[0.39,1.95]
Age	1.03***	1.04***	1.04***	1.04***	1.03***	1.03***
(centred)	[1.02,1.04]	[1.04,1.05]	[1.03,1.05]	[1.03,1.05]	[1.03,1.04]	[1.02,1.03]
Age^2	1.00	1.00*	1.00	1.00	1.00	1.00
(centred)	[1.00,1.00]	[1.00,1.00]	[1.00,1.00]	[1.00,1.00]	[1.00,1.00]	[1.00,1.00]
Sex						
Male	1.00	1.00	1.00	1.00	1.00	1.00
	[1.00,1.00]	[1.00,1.00]	[1.00,1.00]	[1.00,1.00]	[1.00,1.00]	[1.00,1.00]
Female	1.34*	1.06	1.10	0.99	1.01	1.11*
	[1.09,1.65]	[0.96,1.17]	[0.97,1.25]	[0.87,1.13]	[0.95,1.08]	[1.02,1.21]
Observations	2653	7380	7150	7303	22215	17643
Adjusted R^2	0.05	0.08	0.07	0.05	0.03	0.02
BIC	3491.90 (10)	9150.30 (10)	8874.23 (11)	8976.34 (11)	25737.99 (11)	19228.25 (11)

*p<.05 * p<.01 ** p<.001 ***.*



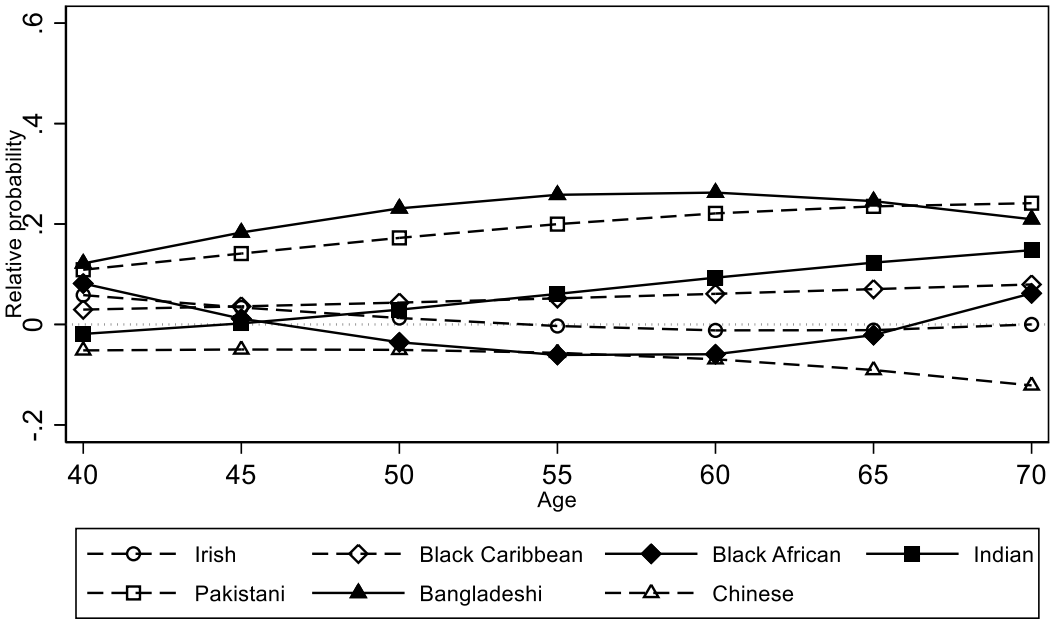
Sources: Fourth National Survey 1993; Health Survey for England 1999; Health Survey for England 2004; Citizenship Survey 2007; Understanding Society wave 1 2009/11; Understanding Society wave 7 2015/17.
Model 1 adjusts for ethnicity, age, age-squared, and sex. Model 2 additionally adjusts for socio-economic position. Model 3 additionally adjusts for racism and racial discrimination.
Note that Model 3 for Understanding Society wave 1 is estimated on the extra five minute sample only (n=2730).

Figure 1: Relative probabilities of limiting long-term illness by ethnicity (comparison group: White/White British)



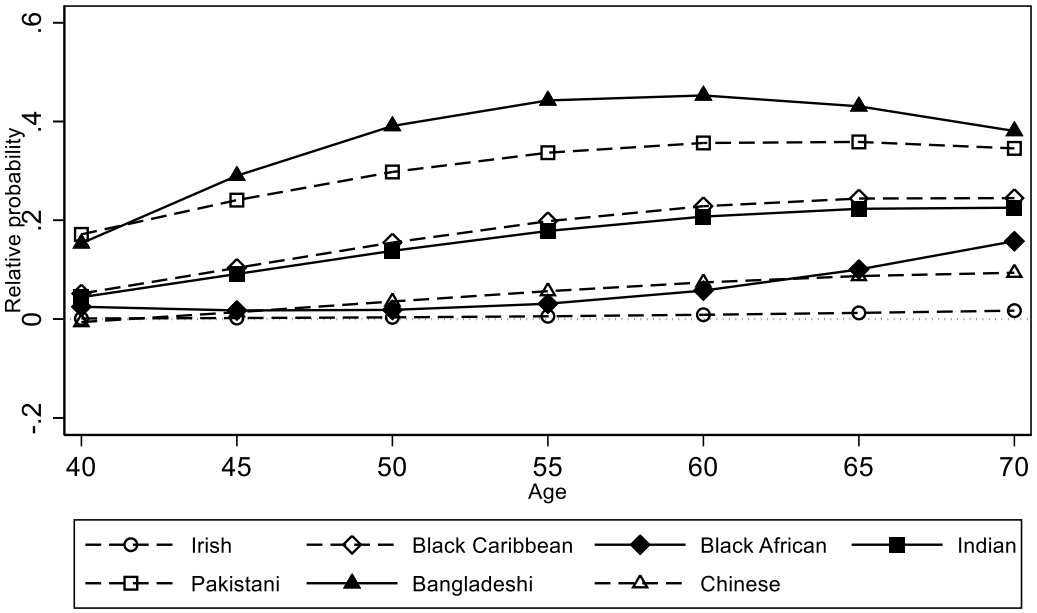
Sources: Fourth National Survey 1993; Health Survey for England 1999; Health Survey for England 2004; Citizenship Survey 2007; Understanding Society wave 1 2009/11; Understanding Society wave 7 2015/17.
Model 1 adjusts for ethnicity, age, age-squared, and sex. Model 2 additionally adjusts for socio-economic position. Model 3 additionally adjusts for racism and racial discrimination.
Note that Model 3 for Understanding Society wave 1 is estimated on the extra five minute sample only (n=2730).

Figure 2: Relative probabilities of fair or poor self-rated health by ethnicity (comparison group: White/White British)



Model is indicative of broader trends of ethnic inequalities in limiting long-term illness in later life.
Model includes main effects of ethnicity, age, age-squared, sex, and survey, and interaction effects of ethnicity, age, and age-squared.
Data are pooled from the Fourth National Study of Ethnic Minorities, Health Survey for England 1999,
Health Survey for England 2004, Citizenship Survey 2007, and Understanding Society waves 1 and 7.
Where respondents are present in both waves 1 and 7 of Understanding Society, data is taken from wave 1 only.

Figure 3: Relative probabilities of limiting long-term illness compared with the White/White British group - interaction effects of ethnicity, age, and age-squared (indicative trends based on pooled data)



Model is indicative of broader trends of ethnic inequalities in fair or poor self-rated health in later life.
Model includes main effects of ethnicity, age, age-squared, sex, and survey, and interaction effects of ethnicity, age, and age-squared.
Data are pooled from the Fourth National Study of Ethnic Minorities, Health Survey for England 1999,
Health Survey for England 2004, Citizenship Survey 2007, and Understanding Society waves 1 and 7.
Where respondents are present in both waves 1 and 7 of Understanding Society, data is taken from wave 1 only.

Figure 4: Relative probabilities of fair or poor self-rated health compared with the White/White British group - interaction effects of ethnicity, age, and age-squared (indicative trends based on pooled data)

[i] We only use waves 1 and 7 of Understanding Society to incorporate new respondents from the refresher Immigrant and Ethnic Minority Boost (IEMB) sample. The IEMB sample was introduced in wave 6, but IEMB respondents were not asked about limiting long-term illness in this wave.

[ii] In the Fourth National Survey of Ethnic Minorities, all respondents were asked about having a long-standing illness, and if this limits the paid work they can do or would like to do. A sub-sample of respondents were asked about limiting long-term illness (LLTI) which affects a list of typical daily activities. We use the latter measure, as it is more compatible with the definitions of LLTI present in the other surveys, although our sample size is reduced as a result.

[iii] Where an NS-SEC position cannot be identified, respondents are coded as 'no class' and retained in the analyses. The reasons for not having an NS-SEC position are numerous, for example, not being in employment, being long-term unemployed, or not providing enough information to derive a social class position. Due to the large within-group heterogeneity, we do not place emphasis on the interpretation of this category.

[iv] To facilitate useful comparisons across surveys and ethnic groups within space restrictions, in Table 1 we only present the percentages in the most advantaged socio-economic positions (i.e. highest income quintile, degree-level education, and managerial or professional occupations), and percentages for those who have experienced racial attacks, fear racial harassment, or have avoided places due to harassment. These measures are, however, categorical in our models.

[v] We formally test the differences in coefficients across surveys using the method outlined in Mize et al. (2019) and find that adjacent survey years do not have significantly different results.

[vi] For the 2009/11 results, only respondents in the extra five minute sample are asked about racism and discrimination, resulting in a heavily reduced sample size for Model 3 (n=2730) compared with Models 1 and 2 (n=22,215). We re-estimated Models 2 and 3 on the extra five minute sample to assess changes in probability for 2009/11 as mentioned in the text.

[vii] We test for global significance using Wald tests.